

Appl. No. 10/809,773

Remarks:

This application presently consists of claims 1, 3, 6, 9-16, 19, 28-30, 33, 36-43, 46, 50, 55-61. Claims 2, 4, 5, 7, 8, 17, 18, 20-27, 31, 32, 34, 35, 44, 45, 47-49, 51-53 and 54 were canceled herein or canceled in earlier amendments, without prejudice. (Applicants may chose to file those claims in a continuation or divisional application claiming priority to this present application.) Claims 1, 15, 16, 19 , 28, 29, 42, 43 and 46 were amended herein and new claim 61 was added herein to recapture the method step in original claim 24 that was canceled when the last Office Action indicated that many more claims were allowable. The present Office Action indicated that claims 10-14, 37-41, and 55-60 were allowable, and that claims 3, 30 and 33 were objected to. Applicants are grateful that the Examiner believes there are patentable claims; however, Applicants believe that other claims should have also been allowed as discussed below.

Claims 1, 2, 6, 9, 15-22, 18, 19, 36, and 42-50 were rejected under 103(a) as being unpatentable over WO 99/60079. Applicants traverse this rejection and respectfully request reconsideration.

Applicants' claims 1, 3, 6, 9, 15, 16, 19, 28, 30, 33, 36, and 61 require an impingement angle and a spread angle and that the cryogenic fluid is jetted at the tool. Hong on the otherhand does not teach nor suggest an impingement angle, does not teach nor suggest a spread angle onto a workpiece and does not teach nor suggest a "jet" of cryogenic fluid. As shown in Hong in Figures 3, 4, 5, 12a, 12b and the description on pages 18 and 19, Hong teaches that the ideal coolant and coolant mechanism that Hong discloses in his patent provides for the coolant to "continuously flow radially outward from the rotating tool to the cutting edge." (emphasis added.) Page 19, lines 1-4. Although Hong uses the word "spray" at line 22 (as indicated by the Office Action), on line 21 he uses "flow" again. Hong also uses the words "deliver", page 3, lines 26, "spreading", page 4, line 13 and page 6, line 10, "applying" page 5, line 25 and page 6, line 12 "expelling" page 6, line 7, "delivering" page 6, line 3, and "distribute" page 6, line 10 to describe the application of the cryogenic cutting fluid to the tool. No where does Hong teach or suggest a jetting of cryogenic fluid at the tool, as Applicants have claimed. Further, in Hong as shown in the figures, the location of the tube 160 is attached to the tool so that the fluid exits the delivery tube parallel to the surface of the edge of the tool and therefore does not provide for any impingement angle of the cryogenic coolant. Further, Hong does not teach nor suggest that the cryogenic coolant should be used to cool the workpiece and therefore has no teaching that the cryogenic coolant should be jetted first at the tool and then sprayed at a spread angle onto the workpiece.

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The Office Action states that the "spray of the tool to the workpiece is seen to happen inherently, as any fluid sprayed on any surface will produce spray at some spread angle." (Office Action, page 3.) Applicants respectfully disagree with that statement. Cryogenic fluids have low boiling points, so unless the flow rate of the cryogenic fluid is sufficient (as in the case of Applicants' jet of the fluid), the fluid when applied to the tool will boil off the tool and not reach the workpiece. Further Hong, directly teaches away from Applicants' invention, and the statement in the Office Action. Hong states at page 9, lines 25-30 states "Due to the extremely low temperature of the liquid nitrogen, its direct contact with the work piece would make the materials to become harder, making them more difficult to be machined. Thus transfer tubes 160 should be mounted on the tool so that the liquid nitrogen is only injected to the cutting edges of the tool and not onto the work piece." (Emphasis added.) A teaching away is strong evidence of nonobviousness.

The Office Action further stated that the "Applicant has not claimed any specific spread angle." Note that the claims have been amended to specify that "the spread angle (β) is such that the cryogenic fluid impinges at least the entire length of contact between the tool and the workpiece." A requirement that that cryogenic fluid be jetted at the tool and impinge on the workpiece at a spread angle that is at least the entire length of contact between the tool and the workpiece is not taught nor suggested by Hong which actually teaches away from contacting the workpiece with the cryogenic coolant.

The Office Action states that it is considered obvious to an ordinary practitioner in the art to test and modify the impingement angle of Hong to optimize the results of the device. That statement must be based on hindsight using Applicants invention, since Hong does not teach an impingement angle. Therefore Applicants respectfully request that all the pending claims 1, 3, 6, 9-16, 19, 28-30, 33, 36-43, 46, 50, 55-61 be allowed to issue in this patent.

This Amendment puts the application in condition for allowance. Early allowance is respectfully requested. If there are any remaining issues, Applicants' attorney would welcome

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a telephone call at 610-481-3598, to discuss them and to move this patent application to allowance without delay.

Respectfully submitted,


Anhe B. Kieman
Reg. No. 36,566

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